



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER OF PATENTS AND TRADEMARKS  
Washington, D.C. 20231  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/907,252	07/17/2001	Zeev Zalevsky	1811.65697	5646

24978 7590 04/04/2002

GREER, BURNS & CRAIN  
300 S WACKER DR  
25TH FLOOR  
CHICAGO, IL 60606

EXAMINER

WOOD, KEVIN S

ART UNIT PAPER NUMBER

2874

DATE MAILED: 04/04/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/907,252

Applicant(s)

ZALEVSKY ET AL.

Examiner

Kevin S Wood

Art Unit

2874

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-55 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3,9,16-19,24,25,45-48 and 55 is/are rejected.
- 7) ☒ Claim(s) 2,4-8,10-15,20-23,26-44 and 49-54 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 July 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.

- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

## DETAILED ACTION

### *Specification*

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.
2. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

3. The abstract of the disclosure is objected to because it includes legal phraseology that should be avoided. The use of the word "said" should be avoided in an abstract. Correction is required. See MPEP § 608.01(b).

### ***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1 and 45 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Art Unit: 2874

Claim 1 recites the limitations "said polarizing surface" in line 12<sup>th</sup> line of the claim. There is insufficient antecedent basis for this limitation in the claim. Antecedent basis exists for a polarizing beam splitting surface, not a polarizing surface.

Claim 45 is unclear. It is unclear what is meant by the phrase "the beam splitter having a polarizing beam splitting surface and reflective surface at opposite sides of said polarizing beam splitting surface". How can a polarizing beam splitting surface be on an opposite side of itself?

### ***Claim Rejections - 35 USC § 102***

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

7. Claims 1, 9, 16-19, 24-25, and 45-46 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,331,910 to Dultz et al.

Referring to claim 1, Dultz et al. discloses all the limitations of the claimed method. Dultz et al. discloses a switching method comprising: providing an input beam onto a polarizing beam splitting surface (1) for splitting the input beam into two beam components of different polarizations propagating along different optical paths; passing

Art Unit: 2874

the input beam components of different polarizations through a controllable polarization rotating medium (6) operable to selectively affect the polarization of each of the beam components; and directing (7) the beam components that have passed through the polarization rotating medium onto the polarizing beam splitting surface (1) to produce at least one output beam propagating towards at least one selected output channel, depending on a current mode of the medium. See the figures of the reference along with their respective portions of the specification.

Referring to claim 9, Dultz et al. discloses all the limitations of the claimed method. Dultz et al. discloses a switching method comprising the step of providing incidence of the split beam components of the input beam onto the medium with an incidence angle.

Referring to claim 16, Dultz et al. discloses all the limitations of the claimed device. Dultz et al. discloses a switch device comprising: a polarizing beam splitting surface (1) capable of splitting an input beam into two beam components of different polarizations and directing the split beam components to propagate along different optical paths, and capable of combining two beam components of different polarizations to produce at least one output beam; a controllable polarization rotating medium (6) within the optical paths of the input beam components, and selectively operable to affect the polarization thereof; and beam directing means (7) accommodated in optical path of the beam the beam components passed through the polarization rotating medium for directing the beam components onto the polarizing beam splitting surface to produce at

Art Unit: 2874

least one output beam propagating towards at least on selected output channel. See the figures of the reference along with their respective portions of the specification.

Referring to claim 17, Dultz et al. discloses all the limitations of the claimed device. Dultz et al. discloses a switch device wherein the medium is based on an electro-optic effect. It is disclosed as an electro-optical element (6).

Referring to claim 18, Dultz et al. discloses all the limitations of the claimed device. Dultz et al. discloses a switch device wherein the electro-optic effect is a linear effect.

Referring to claims 19, Dultz et al. discloses all the limitations of the claimed device. Dultz et al. discloses a switch device wherein the medium is made of a ferroelectric liquid crystal. See col. 4, line 7.

Referring to claim 24, Dultz et al. discloses all the limitations of the claimed device. Dultz et al. discloses a switch device wherein the medium is made of a liquid crystal (LC) material.

Referring to claim 25, Dultz et al. discloses all the limitations of the claimed device. Dultz et al. discloses a switch device operating as a 1x2 switch.

Referring to claim 45, Dultz et al. discloses all the limitations of the claimed method. Dultz et al. discloses an optical device comprising: a beam splitter made of controllable polarization rotating material shiftable between its inoperative mode, which does not effect polarization of a beam passing therethrough, and an operative state, in which it affects polarization of a beam passing therethrough, the beam splitter having a polarizing beam splitting surface and reflective surfaces at opposite sides of the beam

Art Unit: 2874

splitter, the polarizing beam splitting surface being capable of splitting a non-polarized input beam into two beam components of different polarizations and directing the split beam components to propagate along different optical paths towards the corresponding reflective surfaces, and capable of combining beam components of different polarization states, directed onto the polarizing beam splitting surface by the reflective surfaces, producing at least one output beam propagating towards the selected output channel.

Referring to claim 46, Dultz et al. discloses all the limitations of the claimed method. Dultz et al. discloses an optical device that operates as a 1x2 switch.

8. Claim 55 is rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,160,665 to Yuan.

Referring to claim 55, Yuan discloses all of the limitations of the claimed invention. Yuan discloses a method for splitting an unpolarized input beam into two output beam components including: directing the input beam (p1) onto a first polarizing beam splitting surface (501), obtaining two beam components of different polarizations; directing at least one of the beam components, onto a filtering means comprising a second polarizing beam splitting surface (507), filtering the light to correct for an noise created by the first polarizing beam splitter. See Fig. 5C and the respective portion of the specification.

Art Unit: 2874

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

11. Claims 3, 47 and 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,331,910 to Dultz et al. in view of U.S. Patent No. 5,363,228 to DeJule et al.

Referring to claim 3, all of the limitations of the claimed invention have been disclosed by Dultz et al., except Dultz et al. does not disclose at least one output beam being directed towards an additional polarizing beam splitting surface, and passing the split beam s through an additional controllable polarization rotating medium, and directing the beam components using additional beam directing means to produce at least on additional output beam. DeJule et al. disclose a beam splitting switch that is



Art Unit: 2874

used in series with other beam splitting switches for the purpose of increasing the number of output ports. Since Dultz et al. and DeJule et al. are both from the same filed of endeavor, the purpose disclosed by DeJule et al. would have been recognized in the pertinent art of Dultz et al. It would have been obvious to a person having ordinary skill in the art at the time of invention to link several of the switches disclosed by Dultz et al. in series with each other for the purpose of increasing the number of output ports for the switching system.

Referring to claim 47, all the limitations of the claimed invention are disclosed by Dultz et al. in view of DeJule et al. Dultz et al. discloses the switching device, while DeJule et al. discloses similar switching devices linked together to form a multi-stage switch capable of forming a 1XN or 2xN switch. By linking the switches disclosed by Dultz et al. in the manner disclosed by DeJule et al., an optical switch including all the limitations of the claimed invention is formed.

Referring to claim 48, all the limitations of the claimed invention are disclosed by Dultz et al. in view of DeJule et al. By connecting the switches disclosed by Dultz et al. in the manner disclosed by DeJule et al., a device is formed that includes all the limitations of the claimed invention.

### ***Allowable Subject Matter***

12. Claims 2, 4-8, 10-15, 20-23, 26-44, and 49-44 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this

Art Unit: 2874

Office action and to include all of the limitations of the base claim and any intervening claims.

13. The following is a statement of reasons for the indication of allowable subject matter:

Referring to claim 2, the prior art does not disclose all the limitations of the claimed method, including having the input beam pass through the controllable polarization rotating medium prior to being split into two beam components of different linear polarization states.

Referring to claims 4 and 5, the prior art does not disclose all the limitations of the claimed method, including operating the controllable polarization rotating medium to be in its operative mode, in which it affects the polarizations of the beam components, thereby producing two output beams.

Referring to claim 6-8, the prior art does not disclose all the limitations of the claimed method, including the step of passing at least one of the split beam components of the input beam through an optical filtering means accommodated in the optical path of at least one split beam component, to filter light that has interacted with the polarizing beam splitting surface to correct for an error introduced by the polarizing beam splitting surface.

Referring to claim 10, the prior art does not disclose all the limitations of the claimed method, including the medium being operated to provide a desired difference in phase delay in a range  $0-\frac{\lambda}{2}$  between two principal axes of the medium, thereby enabling to obtain desirable partition between the two output channels.

Referring to claim 11, the prior art does not disclose all the limitations of the claimed method, including use of the method for multicast switching.

Referring to claim 12, the prior art does not disclose all the limitations of the claimed method, including the medium being operated to provide a desired difference in phase delay in a range  $0-\lambda/2$  between two principal axes of the medium, one of the output channels being blocked, thereby enabling variable attenuating.

Referring to claim 13, the prior art does not disclose all the limitations of the claimed method, including the medium being selected to compensate for a hysteresis phenomenon occurring in the medium.

Referring to claim 14, the prior art does not disclose all the limitations of the claimed method, including an electrostatic field applied to the medium is selected so as to fit phases of the beam components passing therethrough, thereby compensating for a phase shift caused by beam reflection effects during the beam propagation.

Referring to claim 15, the prior art does not disclose all the limitations of the claimed method, including an electrostatic field applied to the medium such as to cause a difference of  $\lambda/2$  in phase delay between the split beam components of different polarizations, the method thereby enabling to reduce switching differential voltage requirements.

Referring to claim 20, the prior art does not disclose all the limitations of the claimed invention, including the ferroelectric crystal being lithium niobate.

Referring to claim 21, the prior art does not disclose all the limitations of the claimed invention, including the electro-optic effect being a quadratic effect.

Art Unit: 2874

Referring to claims 22 and 23, the prior art does not disclose all the limitations of the claimed invention, including the medium being made of ceramics.

Referring to claims 26-30 and 37, the prior art does not disclose all the limitations of the claimed invention, including the polarization rotating medium comprising two elements and the beam directing means reflecting the input beam towards the polarization rotating elements.

Referring to claims 31-36 and 38, the prior art does not disclose all the limitations of the claimed invention, including the beam directing means at least partly incorporated within the controllable polarization rotating medium.

Referring to claim 39, the prior art does not disclose all the limitations of the claimed invention, including the polarizing beam splitting surface is a surface of a polarizing cubic beam splitter, which has three truncated corners forming three locally adjacent facets, such that the intermediate facet intercepts with a plane of the polarizing beam splitting surface, the polarization rotating means being in the form of a plate accommodated at the intermediate facet outside of the beam splitter and having a reflective surface.

Referring to claim 40, the prior art does not disclose all the limitations of the claimed invention, including the polarizing beam splitting surface is a surface of a polarizing beam splitter cube, the beam directing means including reflective surfaces of the polarizing beam splitter.

Referring to claim 41, the prior art does not disclose all the limitations of the claimed invention, including the beam directing means being accommodated in the

Art Unit: 2874

optical path of the split beam components of the input beam to direct the beam components to the polarization rotating means.

Referring to claims 42-44, the prior art does not disclose all the limitations of the claimed invention, including an optical filtering means accommodated in the optical path of at least one of the split beam components propagating towards the controllable polarization rotating medium.

Referring to claim 49, the prior art does not disclose all the limitations of the claimed method, including blocking of the output of a third switch device to prevent light output.

Referring to claim 50, the prior art does not disclose all the limitations of the claimed method, including blocking of the output of a third switch device to prevent light output.

Referring to claim 51, the prior art does not disclose all the limitations of the claimed method, including the medium being operated to provide a desired difference in phase delay in a range  $0-\lambda/2$  between two principal axes of the medium.

Referring to claim 52, the prior art does not disclose all the limitations of the claimed method, including the medium being operated to provide a desired difference in phase delay in a range  $0-\lambda/2$  between two principal axes of the medium.

Referring to claim 53, the prior art does not disclose all the limitations of the claimed method, including the medium being selected to compensate for a hysteresis phenomenon occurring in the medium.

Art Unit: 2874

Referring to claim 54, the prior art does not disclose all the limitations of the claimed method, including the operation of the controllable polarization rotating medium is appropriately controlled such as to cause a difference of  $\lambda/2$  in phase delay between the split beam components of different polarizations.

### ***Conclusion***

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent No. 6,360,037 to Riza

U.S. Patent No. 6,360,034 to Chang

U.S. Patent No. 6,275,312 to Derks et al.

U.S. Patent No. 6,137,619 to Chen et al.

U.S. Patent No. 6,049,404 to Wu et al.

U.S. Patent No. 5,724,165 to Wu

Each of these references discloses a optical switch similar to the claimed invention.

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin S Wood whose telephone number is (703) 605-5296. The examiner can normally be reached on Monday-Thursday (7am - 5:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney B Bovernick can be reached on (703) 308-4819. The fax phone

Art Unit: 2874

numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 307-0956.

KSW  
March 28, 2002



**Brian Healy**  
**Primary Examiner**